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RADIUM MONITORING NETWORK

DATA RELEASE NUMBER 15

PUBLIC HEALTH SERVICE, DENVER, COLORADO

JULY 1969

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RADIUM MONITORING NETWORK

DATA RELEASE NO. 15

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
COLORADO RIVER BASIN WATER QUALITY CONTROL PROJECT
DENVER, COLORADO

JULY 1969

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16. Abstracts
This fifteenth data release report provides radium-226 and uranium results that supplement data from 14 previous reports dated October 1962 through January 1969. The tabular data indicate evidence of uranium mining and milling from analysis of composite water samples at stations of the Radium Monitoring Network of the Colorado River Basin Water Quality Control Project. The network is a surveillance system consisting of continuous surface water sampling at 27 locations throughout the basin. It assays the radiological content of river water over the entire basin.

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17b. Identifiers/Open-Ended Terms

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*Radium	Water pollution sampling	Industrial wastes
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Water supply	*Uranium	

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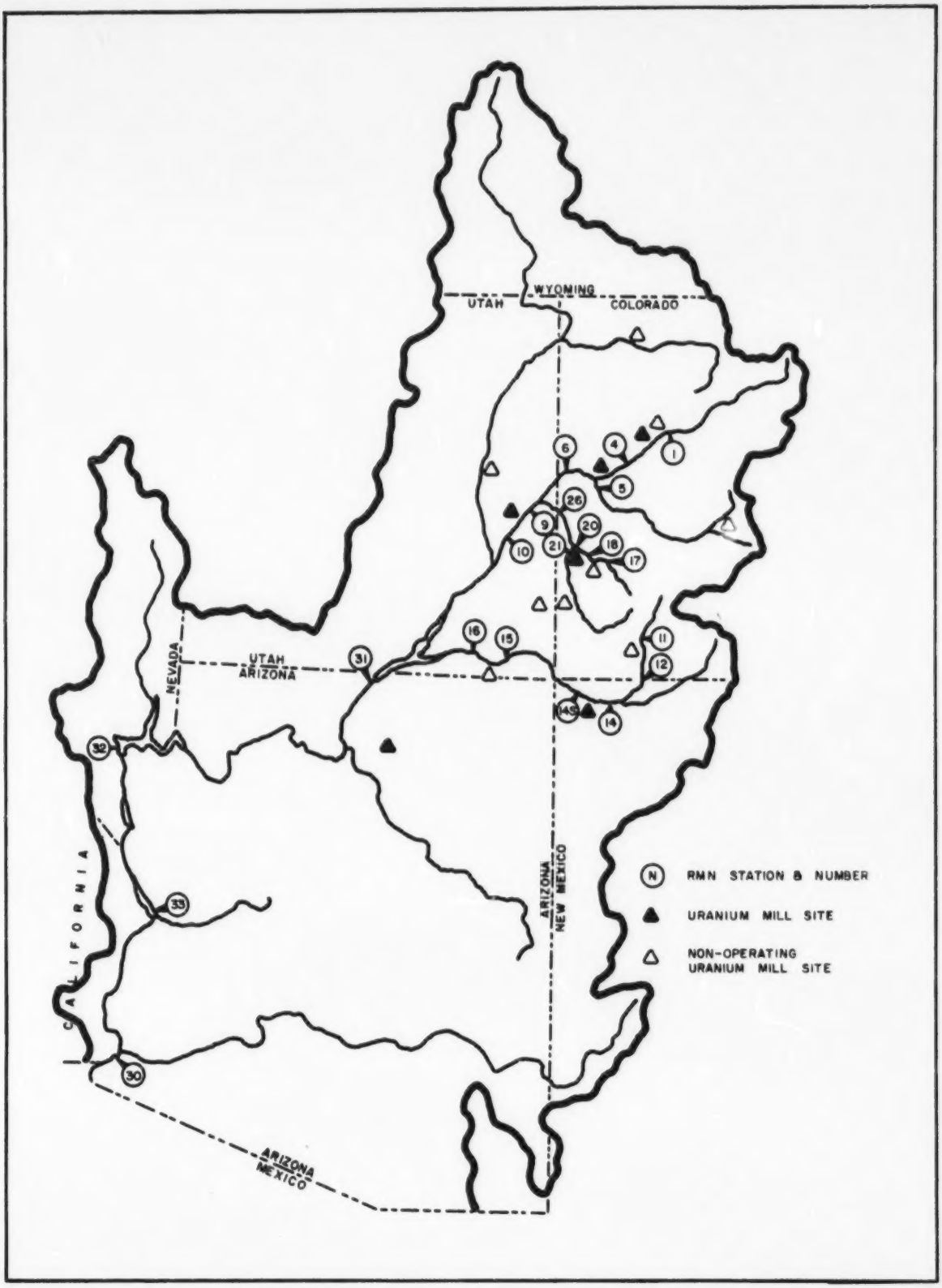

GPO 851-409

COLORADO RIVER BASIN RADIUM MONITORING NETWORK

COLORADO RIVER BASIN WATER QUALITY CONTROL PROJECT

RADIUM MONITORING NETWORK DATA RELEASE NO. 15

INTRODUCTION

This is the fifteenth release of data collected through the Radium Monitoring Network, which is maintained by the Colorado River Basin Water Quality Control Project, Federal Water Pollution Control Administration. The purpose of this release is to supplement data given in the fourteen previous releases dated October 1962 through January 1969.

Summary reports of Radium Monitoring Network data collected through December 1967 were published in the November 1964, November 1965, May 1968, and December 1968 issues of Radiological Health Data. The November 1964 issue also gives data on sediments collected through March 1964 and on some waters and sediments collected prior to the establishment of the Radium Monitoring Network.

The Radium Monitoring Network is a surface water surveillance system consisting currently of twenty sampling stations located on various streams and reservoirs throughout the Colorado River Basin. During initial stages of the surveillance program, the system consisted of twenty-seven sampling stations. The purpose of the network is to provide continuous monitoring of radioactivity concentrations of Basin surface water so that the contribution from uranium mining and milling industry waste discharges can be determined. Samples are analyzed for radium-226, uranium, gross alpha, gross beta, thorium (alpha), lead-210, polonium-210, and strontium-90 to provide a comprehensive picture of contributions of radiological contaminants to surface waters of the Colorado River Basin by the uranium industry and by fallout from the testing of nuclear devices.

SAMPLING PROCEDURES

Depending upon circumstances prevailing at individual stations, Radium Monitoring Network (RMN) samples are collected as either automatic or grab samples. Grab samples are collected once or three times per week and automatic samples are collected in 21-ml. portions every hour. The samples are sent as collected to the Colorado River Basin Water Quality Control Project Laboratory where they are composited and filtered through 0.45-micron membrane filters as soon as possible after the samples for the compositing period are received. After filtration, samples are acidified with 2% by volume of 12N HCl and radiochemical determinations are then performed on the filtered water.

SIGNIFICANT FIGURES

After a careful consideration of the accuracies and precisions involved in the various analytical procedures, it was decided to report data to two significant figures except in those instances where the lower

limit of detection was being approached. In the latter instances, only one significant figure is reported. The last significant figure is usually an estimate.

In averages, three figures are retained if the precision and significance of the averaged data justify such retention. Thus, the overall averages for radium-226 at stations 11 and 26 are reported, respectively, as 0.05 and 1.20 picograms per liter (Table 1).

ERROR

Standard deviations of results reported in Table 3 are at the 95 per cent confidence level (1.96σ).

Standard deviations of the previous year mean are reported for an individual value at the 68.27 per cent confidence level (1σ).

RESULTS

The appendix contains the data on dissolved radium-226 and uranium in samples collected since those which were reported in the fourteenth data release along with arithmetical means for the current reporting period and for the previous year. A summary of all data on radium-226 and uranium is given in Table 1. Mean annual concentrations of radium-226 for each station are given in Table 2. Gross alpha, gross beta, lead-210, polonium-210, thorium (alpha), and strontium-90 data on samples collected at selected stations through March 1967 were reported in Data Release Nos. 7, 8, 10, 11, and 12. Available additional data on these parameters are given in Table 3.

Radium-226 concentrations at all stations except RMN Station 20 continue to average below recommended maximum concentrations. As compared with results from the previous reporting period, fifteen stations showed lower or unchanged concentrations of radium-226. Radium-226 concentrations at five stations showed significant percentage increases, but only two of these increases are regarded as significant because of the absolute concentrations involved. These two stations will be discussed later. Uranium concentrations at all stations increased at least slightly; the increases in total activity were particularly noticeable at two stations.

Lead-210, polonium-210, and thorium (alpha) concentrations, while detectable in some of the quarterly composited samples, are of no significance insofar as health hazards are concerned. Generally, higher concentrations were observed below the uranium mill at Uravan, Colorado, than at other stations for which data were available. Gross alpha and gross beta activity concentrations also are generally higher at the same station.

Results above the mill are not available for a direct comparison. Stations located above and below the uranium mill at Moab, Utah, showed higher concentrations of gross alpha and gross beta activities than did the other stations, except the one below Uravan. However, at Moab, the difference in the upstream and downstream averages is not striking. None of the gross alpha and gross beta results indicates a potential hazard aside from the possible inclusion of radium-226 and strontium-90 in the gross figures for alpha and beta.

For the five quarters shown in Table 3, strontium-90 concentrations averaged 1.7 picocuries per liter at RMN Stations 9 and 15 and 0.9 picocurie per liter at RMN Station 4. These concentrations are below water quality standards set by the states.

Radium-226 concentrations in the San Miguel River below Uravan, Colorado, for this reporting period, averaged 3.94 picograms per liter as compared with 1.90 for the previous period, 2.71 for the previous year, and 1.58 for the long-term average. Furthermore, the mean annual concentration for calendar year 1968 was 3.37 picograms (3.30 picocuries*) per liter. At Gateway, Colorado, radium-226 concentrations in the Dolores River averaged 1.9 picograms per liter as compared with 1.02 for the previous period, 1.4 for the previous year, and 1.20 for the long-term average. Uranium concentrations at both stations were at about twice their long-term averages.

The Water Quality Standards adopted by the State of Colorado are based upon limits set in Public Health Service Drinking Water Standards and in recommendations of the Federal Radiation Council. In the absence of such limits, 1/30 of the 168-hour-week value given in National Bureau of Standards Handbook 69 is to be used. Public Health Service standards also are based on FRC recommendations which, in turn, are based on intakes of radionuclides from all routes of exposure. In the case of radium-226, the FRC limit is 20 picocuries intake per day (average exposure) from all sources. According to standards of the Public Health Service, if radium-226 concentrations exceed 3 picocuries per liter, surveillance must indicate that total radium-226 intake is within FRC limits before the water supply may be approved. This point has now been reached at the station on the San Miguel River below Uravan.

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*Assuming 1 picogram radium = 0.98 picocurie

TABLE 1

RADIUM-226 AND URANIUM CONCENTRATIONS IN SURFACE WATERS OF THE COLORADO RIVER BASIN

Station Number and Location	Radium-226			Uranium		
	Av.[a] pg/l	Range pg/l	No. of Analyses	Av.[a] pg/l	Range pg/l	No. of Analyses
Animas River						
11 above Durango, Colorado	0.05	0.00-0.11	87	1.4	0.1-3.4	81
12 Colorado-New Mexico State Line	0.23	0.03-1.5	130	3.1	0.0-18	88
Colorado River						
1 at Silt, Colorado	0.20	0.04-0.39	92	3.2	0.0-5.3	78
4 at DeBeque, Colorado	0.19	0.05-0.44	93	3.7	0.4-7.2	78
6 at Fruita, Colorado	0.17	0.09-0.40	87	8.4	2.0-14	78
9 above Moab, Utah	0.25	0.10-0.52	121	9.6	2.4-31	108
10 below Moab, Utah	0.46	0.16-7.2	116	11	2.2-22	103
31 at Page, Arizona	0.19	0.04-0.36	65	6.7	2.8-13	66
32 Lake Mead	0.33	0.17-0.60	73	7.9	5.0-11	73
33 Lake Havasu	0.34	0.18-0.44	70	7.8	5.4-11	70
30 at Yuma, Arizona	0.16	0.06-0.33	83	7.5	2.0-11	78
Dolores River						
21 at Bedrock, Colorado	0.42	0.03-1.4	91	10	0.1-35	78
26 at Gateway, Colorado	1.20	0.04-3.8	129	16	0.1-51	107
Green River						
28 below Maybell, Colorado	0.09	0.03-0.15	36	2.7	0.6-8.0	32
29 below Green River, Utah	0.09	0.05-0.15	29	5.0	1.6-7.6	26

TABLE 1 (Contd)

RADIUM-226 AND URANIUM CONCENTRATIONS IN SURFACE WATERS OF THE COLORADO RIVER BASIN

Station Number and Location	Radium-226 Av.[a] pg/l	Radium-226 Range pg/l	Radium-226 No. of Analyses	Uranium Av.[a] µg/l	Uranium Range µg/l	Uranium No. of Analyses
Gunnison River						
24 above Gunnison, Colorado	0.05	0.01-0.08	43	1.2	0.0-2.6	33
25 below Gunnison, Colorado	0.04	0.01-0.09	46	2.3	0.4-4.3	33
5 at Grand Junction, Colorado	0.09	0.01-0.30	87	10	0.7-19	78
San Juan River						
13 above Farmington, N. M.	0.07	0.03-0.16	20	2.8	0.0-8.3	19
14 below Farmington, N. M.	0.07	0.03-0.21	80	2.9	0.3-9.0	79
14S below Shiprock. N. M.	0.08	0.03-0.28	165	9.1	0.1-93	161
15 above Mexican Hat, Utah	0.11	0.04-0.66	79	6.0	1.0-23	66
16 below Mexican Hat, Utah	0.12	0.01-0.84	157	8.4	0.8-35	139
San Miguel River						
17 above Naturita, Colorado	0.04	0.00-0.14	106	2.3	0.0-8.2	78
18 above Uravan, Colorado	0.20	0.03-1.2	139	5.7	0.8-63	108
20 below Uravan, Colorado	1.58	0.06-26	366	22	0.0-260	337

a Average concentration obtained from all data presented in this and previous data releases.

TABLE 2

MEAN ANNUAL CONCENTRATIONS OF RADIUM-226
IN WATER AT MONITORING NETWORK STATIONS, 1961-1968

Values in Picograms per Liter

RMN Station No.	Location	Years							
		1961	1962	1963	1964	1965	1966	1967	1968
1	Colorado River at Silt, Colorado	0.18	0.15	0.23	0.25	0.16	0.20	0.20	0.19
4	Colorado River above DeBeque, Colorado	0.20	0.16	0.23	0.22	0.17	0.18	0.19	0.18
5	Gunnison River above Grand Junction, Colo.	--	0.07	0.11	0.12	0.07	0.09	0.08	0.08
6	Colorado River near Fruita, Colorado	--	0.17	0.21	0.18	0.17	0.16	0.17	0.14
9	Colorado River above Moab, Utah	0.34	0.24	0.29	0.27	0.19	0.26	0.28	0.24
10	Colorado River below Moab, Utah	0.41	0.33	0.54	0.32	0.27	0.39	0.93	0.45
11	Animas River at Durango, Colorado	0.05	0.05	0.06	0.05	0.04	0.05	0.05	0.05
12	Animas River at Colo.-N. M. State Line	0.37	0.37	0.23	0.13	0.09	0.09	0.09	0.07
13	San Juan River above Farmington, N. M.	--	0.08	0.07	0.04	--	--	--	--
14	San Juan River at Fruitland, New Mexico	--	0.12	0.12	0.07	0.06	0.05	0.06	0.06
14S	San Juan River below Shiprock, N. M.	--	0.11	0.12	0.09	0.06	0.05	--	--
15	San Juan River above Mexican Hat, Utah	0.18	0.15	0.13	0.14	0.07	0.08	0.08	0.09
16	San Juan River below Mexican Hat, Utah	0.34	0.24	0.16	0.09	0.07	0.07	0.08	0.07
17	San Miguel River above Naturita, Colorado	0.02	0.04	0.04	0.05	0.05	0.05	0.04	0.04
18	San Miguel River above Uravan, Colorado	0.14	0.21	0.33	0.14	0.16	0.13	0.12	0.11
20	San Miguel River below Uravan, Colorado	0.98	0.84	1.34	0.86	0.46	1.92	1.57	3.37
21	Dolores River at Bedrock, Colorado	0.85	0.39	0.45	0.61	0.28	0.33	0.50	0.30
22	Tomichi Creek above Gunnison, Colorado	0.02	--	--	--	--	--	--	--
24	Gunnison River above Gunnison, Colorado	0.03	0.05	0.05	0.05	0.04	--	--	--
25	Gunnison River below confluence of Tomichi Creek, Gunnison, Colorado	0.04	0.04	0.05	0.04	0.03	--	--	--
26	Dolores River at Gateway, Colorado	0.42	1.38	1.03	1.13	0.67	1.20	1.22	1.78
28	Yampa River below Maybell, Colorado	0.11	0.09	0.09	0.09	0.06	--	--	--
29	Green River below Green River City, Utah	--	0.06	0.10	0.09	--	--	--	--
30	Colorado River at U. S.-Mexican Border	--	0.15	0.17	0.18	0.16	0.16	0.17	0.14
31	Colorado River at Page, Arizona	--	--	0.25	0.25	0.17	0.15	0.14	0.16
32	Colorado River at (Lake Mead) Boulder City, Nevada	--	--	0.33	0.31	0.41	0.41	0.32	0.22
33	Colorado River at Metropolitan Water District Intake, Lake Havasu, Cal.-Ariz.	--	--	0.35	0.36	0.36	0.39	0.34	0.26

TABLE 3

RADIOCHEMICAL ANALYSIS OF QUARTERLY COMPOSITE RMN WATER SAMPLES

Station Number and Location	Quarter Period[1/]	Gross α pc/l	Gross β pc/l	Sr-90 pc/l	Th (α) pc/l	Pb-210 pc/l	Po-210 pc/l	Date of Po-210 Determination
RMN 4								
Colorado River at DeBeque, Colorado	1	5.1	6.6	0.5±0.1	--	--	--	--
	2	3.9±0.4	9.0±1.4	0.9±0.1	--	--	--	--
	3	6.0±0.6	9.2±2.0	0.8±0.1	--	--	--	--
	4	5.8±1.1	6.3±1.6	1.8±0.2	0.03±0.04	0.1±0.1	0.00±0.02	9/18/68
	5	3.2±0.8	3.8±1.5	0.5±0.1	0.05±0.04	0.0±0.0	0.03±0.03	9/19/68
RMN 9								
Colorado River above Moab, Utah	1	6.5	9.5	0.8±0.1	--	--	--	--
	2	10±1	21±2	3.6±0.3	--	--	--	--
	3	11±1	7.9±2.5	2.6±0.2	--	--	--	--
	4	11±2	5.6±1.4	0.9±0.1	0.10±0.04	0.0±0.0	0.08±0.02	9/18/68
	5	5.3±0.8	7.4±1.5	0.8±0.1	0.13±0.04	0.1±0.1	0.04±0.03	9/19/68
RMN 10								
Colorado River below Moab, Utah	1	8.1	13	--	0.09	0.0	0.61	8/10/67
	2	13±1	15±2	--	0.10±0.00	0.0±0.1	0.04±0.01	3/18/68
	3	14±1	12±4	--	0.32±0.03	0.0±0.1	0.09±0.01	3/18/68
	4	11±1	10±1	--	0.09±0.04	0.1±0.1	0.02±0.03	9/18/68
	5	6.9±0.8	8.6±1.6	--	0.14±0.04	0.0±0.0	0.06±0.03	9/20/68
RMN 15								
San Miguel River above Mexican Hat, Utah	1	7.1	9.9	1.3±0.1	--	--	--	--
	2	7.4±0.6	19±2	3.1±0.2	--	--	--	--
	3	5.4±0.4	14±3	2.0±0.2	--	--	--	--
	4	5.2±0.8	6.3±1.1	1.2±0.2	0.15±0.04	--	--	--
	5	3.4±0.5	5.3±1.2	0.8±0.1	0.08±0.02	0.1±0.1	0.04±0.03	9/20/68

TABLE 3 (Contd)

RADIOCHEMICAL ANALYSIS OF QUARTERLY COMPOSITE RMN WATER SAMPLES

Station Number and Location	Quarter Period[1/]	Gross α pc/l	Gross β pc/l	Sr-90 pc/l	Th (α) pc/l	Pb-210 pc/l	Po-210 pc/l	Date of Po-210 Determination
RMN 16								
San Juan River below Mexican Hat, Utah	1	6.1	11	--	0.00	0.2	0.01	8/10/67
	2	6.2±0.5	14±2	--	0.03±0.02	0.1±0.1	0.02±0.01	3/18/68
	3	4.3±0.5	18±3	--	0.11±0.02	0.0±0.1	0.00±0.01	3/18/68
	4	7.4±0.9	6.0±0.8	--	0.07±0.04	0.0±0.1	0.01±0.02	9/19/68
	5	3.1±0.5	7.6±1.2	--	0.07±0.04	0.0±0.1	0.01±0.03	9/20/68
RMN 20								
San Miguel River below Uravan, Colorado	1	8.1	11	--	0.18	0.0	0.18	8/10/67
	2	12±1	18±2	--	0.41±0.02	0.0±0.1	0.03±0.01	3/18/68
	3	23±1	19±3	--	0.53±0.03	0.0±0.0	0.09±0.02	3/18/68
	4	48±2	34±2	--	1.3±0.1	0.2±0.1	0.17±0.03	9/18/68
	5	6.3±0.7	8.6±2.0	--	0.4±0.0	0.1±0.1	0.06±0.03	9/20/68

1/ Quarter Period

1 April - June 1967
2 July - September 1967
3 October - December 1967
4 January - March 1968
5 April - June 1968

A P P E N D I X

Results of Radium-226 and Uranium Analyses of Samples
from Individual Radium Monitoring Network Stations
for Current Reporting Period

RMN Station 1: Colorado River at Silt, Colorado
Started: November 25, 1961
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 30-October 28	0.23	4.9
November 13-November 25	0.21	5.0
December 9	0.26	5.3
1969		
January 13	0.27	4.3
February 10	0.23	3.2
March 10	0.26	3.4
Current reporting period:		
Mean	0.24	4.4
Previous year:		
Mean	0.19	2.8
Std. Dev.	0.08	0.9

RMN Station 4: Colorado River above DeBeque, Colorado
Started: November 21, 1961
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 30-October 28	0.22	5.4
November 13-November 25	0.21	6.6
December 9	0.17	6.1
1969		
January 13	0.18	5.0
February 10	0.17	4.3
March 10	0.17	4.8
Current reporting period:		
Mean	0.19	5.4
Previous year:		
Mean	0.18	4.0
Std. Dev.	0.06	1.6

RMN Station 5: Gunnison River above Grand Junction, Colorado
Started: April 16, 1962
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
October 2-October 16	0.10	14
November 15-November 27	0.09	8.9
December 13	0.08	7.3
1969		
January 16	0.06	8.1
February 13	0.04	15
March 13	0.04	6.2
Current reporting period:		
Mean	0.07	9.9
Previous year:		
Mean	0.08	9.3
Std. Dev.	0.04	3.9

RMN Station 6: Colorado River at Fruita, Colorado
Started: April 16, 1962
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
October 2-October 16	0.14	13
November 15-November 27	0.13	9.1
December 13	0.14	8.7
1969		
January 16	0.13	7.6
February 13	0.16	8.8
March 13	0.09	6.9
Current reporting period:		
Mean	0.13	9.0
Previous Year:		
Mean	0.15	7.7
Std. Dev.	0.03	2.8

RMN Station 9: Colorado River above Moab, Utah
Started: December 11, 1961
Type: Three grab samples per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 2-September 27	0.22	14
September 30-November 1	0.16	12
November 4-November 29	0.16	7.9
December 2-December 27	0.19	9.6
1969		
December 30-January 31	0.16	8.3
February 3-February 28	0.17	9.3
March 3-March 28	0.19	7.4
Current reporting period:		
Mean	0.18	9.8
Previous year:		
Mean	0.27	8.7
Std. Dev.	0.08	3.3

RMN Station 10: Colorado River below Moab, Utah
Started: December 11, 1961
Type: Three grab samples per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 2-September 27	0.35	15
September 30-November 1	0.30	14
November 4-November 29	0.23	13
December 2-December 23	0.24	9.4
1969		
December 30-January 31	0.19	7.6
February 3-February 28	0.22	9.5
March 3-March 28	0.24	8.1
Current reporting period:		
Mean	0.25	10.9
Previous year:		
Mean	0.71	10.8
Std. Dev.	0.37	4.5

RMN Station 11: Animas River at Durango, Colorado
Started: July 17, 1961
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
October 4-November 1	0.04	3.1
November 8-November 27	0.04	3.2
December 6-December 13	0.04	2.2
1969		
January 3-January 31	0.08	2.8
February 14-February 28	0.04	2.2
March 7-March 28	0.08	3.4
Current reporting period:		
Mean	0.05	2.8
Previous year:		
Mean	0.05	1.4
Std. Dev.	0.01	0.6

RMN Station 12: Animas River at Colorado-New Mexico State Line
Started: January 19, 1961
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
July 3-July 16	0.04	2.8
Current reporting period:		
Mean	0.04	2.8
Previous year:		
Mean	0.09	2.4
Std. Dev.	0.02	0.8

RMN Station 14: San Juan River at Fruitland, New Mexico
Started: August 1, 1962
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 11-September 24	0.06	4.1
October 8-October 19	0.05	4.5
November 4-November 20	0.05	4.5
December 18	0.03	2.7
1969		
January 21	0.04	2.4
February 26	0.06	3.0
March 26	0.08	4.2
Current reporting period:		
Mean	0.05	3.6
Previous year:		
Mean	0.06	2.9
Std. Dev.	0.02	1.1

RMN Station 15: San Juan River above Mexican Hat, Utah
Started: December 11, 1961
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1969		
January 20	0.09	5.6
February 25	0.06	4.3
March 25	0.07	5.7
Current reporting period:		
Mean	0.07	5.2
Previous year:		
Mean	0.09	4.1
Std. Dev.	0.04	2.4

RMN Station 16: San Juan River below Mexican Hat, Utah
Started: December 11, 1961
Type: Three grab samples per week (prior to 7/1/68)
One grab sample per week (after 7/1/68)

Date	Radium-226 pg/liter	Uranium µg/liter
1969		
January 20	0.10	5.8
February 25	0.05	3.6
March 25	0.07	6.1
Current reporting period:		
Mean	0.07	5.2
Previous year:		
Mean	0.07	4.4
Std. Dev.	0.02	2.3

RMN Station 17: San Miguel River above Naturita, Colorado
Started: October 28, 1961
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 29-October 27	0.04	8.2
November 3-November 24	0.01	4.4
December 1-December 22	0.04	4.3
1969		
December 29-January 26	0.02	6.0
February 3-February 23	0.02	4.6
March 2-March 23	0.05	3.3
Current reporting period:		
Mean	0.03	5.1
Previous year:		
Mean	0.04	2.8
Std. Dev.	0.01	1.9

RMN Station 18: San Miguel River above Uravan, Colorado
Started: October 27, 1961
Type: Automatic Pump-Timer

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 1-September 29	0.13	7.5
September 30-November 3	0.09	8.4
November 3-December 1	0.12	7.1
December 1-December 29	0.06	5.7
1969		
December 29-January 31	0.06	7.2
February 1-February 23	0.10	7.5
March 2-March 30	0.08	7.0
Current reporting period:		
Mean	0.09	7.2
Previous year:		
Mean	0.10	3.5
Std. Dev.	0.03	1.7

RMN Station 20: San Miguel River below Uravan, Colorado
Started: October 9, 1961
Type: Automatic Pump-Timer

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 1-September 8	5.7	32
September 8-September 15	2.8	32
September 15-September 22	1.6	13
September 22-September 29	1.0	33
September 29-October 6	0.94	26
October 6-October 13	0.87	18
October 13-October 20	1.2	29
October 20-October 27	0.71	26
October 27-November 3	2.4	48
November 3-November 10	4.6	100
November 10-November 17	4.4	25
November 17-November 24	1.9	28
November 24-December 1	2.0	40
December 1-December 8	26	260
December 8-December 15	2.8	24
December 15-December 22	2.8	29
December 22-December 29	6.4	32
1969		
December 29-January 5	6.9	23
January 5-January 12	3.5	48
January 12-January 19	1.4	35
January 19-January 26	1.4	31
January 26-January 31	1.5	46
February 1-February 9	8.9	26
February 9-February 16	8.2	25
February 16-February 23	2.8	43
February 23-March 2	3.8	85
March 2-March 9	4.0	83
March 9-March 16	0.5	17
March 23-March 30	3.3	37
Current reporting period:		
Mean	3.94	45
Previous year:		
Mean	2.71	17
Std. Dev.	3.53	19

RMN Station 21: Dolores River at Bedrock, Colorado
Started: October 30, 1961
Type: Three grab samples per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 2-September 28	0.40	11
September 30-November 1	0.54	18
November 4-November 25	0.43	13
December 2-December 27	0.30	12
1969		
December 30-January 31	0.26	7.1
February 3-February 28	0.22	6.8
March 3-March 28	0.2	6.7
Current reporting period:		
Mean	0.34	10.7
Previous year:		
Mean	0.39	7.7
Std. Dev.	0.25	4.8

RMN Station 26: Dolores River at Gateway, Colorado
Started: October 30, 1961
Type: Three grab samples per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 2-September 28	3.5	32
September 30-November 2	2.1	36
November 4-November 30	1.5	24
December 2-December 28	1.7	40
1969		
December 30-February 1	2.0	23
February 3-March 1	1.7	30
March 3-March 29	1.1	22
Current reporting period:		
Mean	1.9	29.6
Previous year:		
Mean	1.4	20.5
Std. Dev.	1.1	10.6

RMN Station 30: Colorado River at U. S.-Mexican Border
Started: July 30, 1962
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 3-September 27	0.13	6.6
October 4-November 4	0.09	6.8
November 4-November 29	0.10	7.3
December 2-December 27	0.11	7.5
1969		
December 30-January 31	0.11	7.9
February 3-February 28	0.09	6.8
March 3-March 28	0.15	8.8
Current reporting period:		
Mean	0.11	7.4
Previous year:		
Mean	0.16	6.7
Std. Dev.	0.04	1.0

RMN Station 31: Colorado River at Page, Arizona
Started: May 1, 1963
Type: 300-ml. composite per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 30-October 28	0.13	7.2
November 4-November 26	0.15	6.8
December 3-December 30	0.16	6.5
1969		
January 6-January 29	0.12	6.6
February 3-February 24	0.13	6.9
March 3-March 24	0.18	8.1
Current reporting period:		
Mean	0.15	7.0
Previous year:		
Mean	0.17	6.4
Std. Dev.	0.03	1.3

RMN Station 32: Colorado River at (Lake Mead) Boulder City, Nevada
Started: March 11, 1963
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
September 30-October 28	0.17	8.6
November 4-November 25	0.20	8.9
December 2-December 23	0.21	8.3
1969		
December 30-January 27	0.18	8.5
February 3-February 24	0.18	7.6
March 3-March 24	0.23	7.4
Current reporting period:		
Mean	0.20	8.2
Previous year:		
Mean	0.25	6.9
Std. Dev.	0.04	0.6

RMN Station 33: Colorado River at Metropolitan Water District Intake, Lake Havasu, California-Arizona
Started: January 7, 1963
Type: One grab sample per week

Date	Radium-226 pg/liter	Uranium µg/liter
1968		
October	0.24	9.3
Current reporting period:		
Mean	0.24	9.3
Previous year:		
Mean	0.27	6.9
Std. Dev.	0.04	0.6